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2021 microcensus, DRC

Methodology report for the 2021 microcensus in the Democratic Republic of the Congo

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Democratic Republic of the Congo (DRC)

Microcensus 2021

Methodology report

1. Overview

Type of survey: Cross-sectional one-stage cluster survey

Geographic coverage: Seven DRC provinces: Haut-Katanga, Haut-Lomami, Ituri, Kasai, Kasai-Oriental, Lomami and Sud-Kivu.

Date of data collection: 14 March - 27 April 2021

Sampling: Stratified random sampling of enumeration areas as Primary Sampling Units (PSUs), covering a median value of 90 buildings per PSU; 28 strata in total (seven provinces by four settlement classes); full enumeration of all households within selected clusters, and full enumeration of all household members of the households (enumeration areas represent clusters)

Coverage of buildings: where access was feasible, all types of buildings were covered: residential as well as non-residential buildings and buildings serving both purposes (mixed use), including also institutional buildings (schools, churches, etc.). Non-functional buildings (under construction or demolished) were also listed. Refugee camps could not be listed.

Household and household member coverage: where consent was given, all households within enumeration areas; all residents (de facto) and temporary residents (guests) of consenting households. Only private households were listed, population residing in institutional buildings was not included.

Interview mode: Personal interviews using tablets (CAPI)

Team leading the activity:

- Flowminder: Roland Hosner, Survey Statistician; Elsa Dufay, Project Manager; Veronique Lefebvre, Head of Analysis; Alphoncina Bockondas-Manga, project administrator; Alistair Steward, GIS Analyst; Radheshyam Bhattarai, Survey Practitioner; Douglas Amuli Ibale, consultant for implementation; Zachary Strain-Fajth, consultant for data cleaning; Sera Pantillon, intern
- WorldPop (University of Southampton): Attila Lazar, Principal Research Fellow; Gianluca Boo, Research Fellow, Heather Chamberlain, Enterprise Fellow; Edith Darin, Specialist Research Technician
- Kinshasa School of Public Health (KSPH): Didine Kaba, team leader and principal investigator; Pierre Akilimali, project manager; Pelagie Babakazo, field manager

- Bureau Central du Recensement, Institut National de la Statistique (BCR/INS): Henri Marie Kazadi
- eHealth Africa (technical partner)
- Get ODK (technical partner)

2. Introduction

Existing population data for the DRC vary broadly. Large differences in population totals on the national and province level between different data sources raise questions about the accuracy, reliability and ultimately the validity of the data. They also make it difficult to plan for public services, such as health services. Vaccination planning requires accurate and current population data.

Although top-down population estimates for all provinces are available from WorldPop for the year 2020, these estimates are based on UN projections, which in turn are based on 1984 data. An advantage of the WorldPop data is that the spatial distribution might well represent the current population distribution - as the underlying geospatial data are very recent - but the number of population on all levels can only be as accurate as the underlying data. The last census in DRC was implemented in 1984. Preparations for a new census have been underway for years and are currently underway again, but have not yet come to fruition.

As accurate data on population distribution and characteristics is key to the successful planning, implementation, and monitoring of immunisation programmes, the aim of the Mapping for Health project is to produce current bottom-up population estimates for seven provinces, based on microcensus data in combination with geo-spatial data.

These population estimates can be used by health planners to conduct their micro-planning with greater precision and combined with health services mapping will inform population accessibility to immunisation/health services. The microcensus survey will inform these model-based population estimates (disaggregated by sex and age). Also, the inclusion of an extra module on mobility and mobile phone use will support population mobility analysis (Work Package 3).

2.1. Objectives

1. Complete microcensus data collection in 7 DRC provinces
2. Microcensus data to feed into high-resolution population models
3. Enable better vaccination planning
4. Provide population totals (as denominators) for the calculation of quantitative indicators, e.g. [SDG indicators](#) such as vaccination coverage (3.b.1), and for official population statistics
5. Enable future survey work to be based on these population estimates

3. Preparation phase

The implementation of the Mapping for Health microcensus was a joint effort by multiple stakeholders and was successful first and foremost thanks to the tireless efforts of interviewers, supervisors and coordinators on the ground in DRC who went to great lengths to realise this data collection. On the coordination level, a team comprised of staff at Flowminder, WorldPop, the Kinshasa School for Public Health and the DRC Census Bureau co-developed the design, implemented the logistics, monitored progress and quality and facilitated data processing. Flowminder's thanks go to all staff, consultants and field staff involved in this activity, and to all respondents who took part in the microcensus.

Preparations for the microcensus started early in 2020 with a first draft of the design and the questionnaire. KSPH, who is a leading organisation in terms of surveys in DRC (last MICS for example) and who had implemented the last microcensus exercise, was approached to implement this work.

Flowminder, as the lead party for this sub-project and Data Controller (in GDPR terms), had general oversight and overall responsibility for implementation of the microcensus.

Due to COVID-19 travel restrictions, it was not possible for Flowminder's team (based in Europe) to travel to DRC. For this reason, Flowminder contracted Douglas Amuli Ibale as a consultant for the role of **Field Survey Manager**. His role was to monitor progress on the ground, cooperating closely with KSPH and reporting to Flowminder's project team. The Field Survey Manager participated in the preparatory work as well as in field work between January and May 2021.

At the beginning of December 2020, the **Kinshasa School for Public Health (KSPH)** was contracted as the implementing organisation for the microcensus fieldwork. In addition to the service contract between Flowminder and KSPH, a Data Processing Agreement was drafted and signed by both parties in early March 2021.

The **WorldPop** group at the University of Southampton designed and implemented the sampling. They also co-developed other elements of the survey design (e.g. the questionnaire), supported field work and co-monitored progress of data collection. A collaboration agreement was signed in February 2021.

Starting in February 2021, the **Bureau Central de Recensement (BCR)**, part of the DRC Institut National de la Statistique (INS), was informed about the project and regularly updated about its progress. It was also agreed that the microcensus data would ultimately be co-authored between Flowminder, the BCR, WorldPop and KSPH, and co-owned by Flowminder and the BCR. A Data Processing Agreement was signed in April 2021. Weekly meetings were held between all partner organisations to ensure timely communication and resolution of problems encountered, to ensure close and seamless cooperation, and to monitor progress.

For technical implementation, **eHealth Africa** and **ODK** were brought in. Consultations with UNFPA and UNOPS on access to security information were also held.

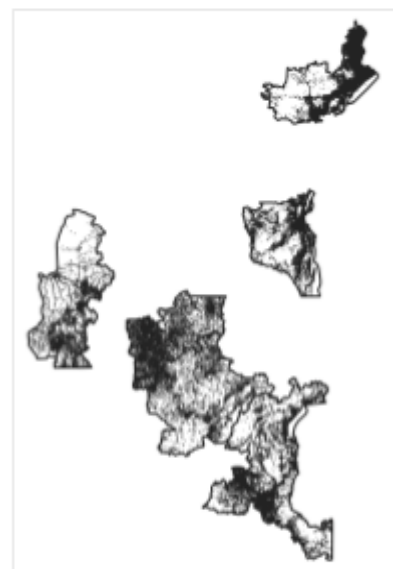
In December 2020 and January 2021, Flowminder and WorldPop developed the survey design, in cooperation with KSPH. In early February 2021, provincial coordinators were trained and recruited. Final preparations for field work were carried out in late February and early March, with data collection starting in all seven provinces between 14 and 23 March. Data collection was completed in all provinces by 27 April. Between May and December 2021, data cleaning and first analyses were completed.

4. Survey design

The microcensus was designed as a **cross-sectional** (one-off) **cluster** survey. For the one-stage cluster design, clusters (enumeration areas) were sampled. Within the clusters, instructions were to enumerate all buildings and the entire population living in that cluster.

Out of the 26 provinces of DRC, **seven provinces** were selected for the microcensus: Haut-Katanga, Haut-Lomami, Ituri, Kasai, Kasai-Oriental, Lomami and Sud-Kivu.

Based on a **spatial sampling frame** of enumeration areas a **stratified sample of 1,596 clusters** was drawn. Stratification criteria were degree of urbanisation and province, so that in each of the seven provinces, four types of settlements (urban areas, periurban areas, villages and hamlets) were equally represented. For each stratum, 57 clusters were sampled, so that the gross sample included 228 clusters in each province (see table 1).



Graph 1. Sampling frame created by WorldPop

The size of the clusters was calculated in such a way that the area and the population could be enumerated by one team within a day, on average, with a target number of 80 buildings on average and a maximum area of 6 hectares. Because of the higher population density in urban and periurban areas, clusters in these locations were smaller in size (area), whereas clusters in rural areas (villages and hamlets) were usually larger in size.

Table 1. Gross sample: clusters by province and settlement type

Province	Hamlet	Village	Periurban	Urban	Total
Haut-Katanga	57	57	57	57	228
Haut-Lomami	57	57	57	57	228
Ituri	57	57	57	57	228
Kasai	57	57	57	57	228
Kasai Oriental	57	57	57	57	228
Lomami	57	57	57	57	228
Sud-Kivu	57	57	57	57	228

Total	399	399	399	399	1,596
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After an initial assessment of expected risks and accessibility by KSPH, two territories were excluded from the sampling frame. Djugu (Ituri) was excluded due to security concerns, Shabunda (Sud-Kivu) was excluded because of its difficult accessibility. All other territories in the selected provinces were covered by the sampling design and the sample.

The aim of the data collection was to enumerate the **de-facto population** at the time of field work. This meant that the goal of the survey was to indeed cover all persons currently present in the interviewed households: permanent residents as well as temporary residents (guests).

All interviews were conducted **in person** by trained interviewers, using tablets, referred to as **Computer-Assisted Personal Interviewing (CAPI)**.

At least three attempts to contact a household were made. Only after three unsuccessful attempts was a household marked as non-response. **Heads of households** were interviewed and asked about all household members. Only if the head of household was not available, interviews with other members of the household (at least 15 years of age) were permissible, provided that that person knew the age and sex of every person in the household. If neither household heads nor other household members are available for an interview, proxy-interviews with a neighbour were permissible, again provided that that person knew the age and sex of every household member.

The **source questionnaire** was developed in **English** and subsequently translated to **French** and three common local languages - **Swahili, Tshiluba, and Lingala**.

To cover both residential and non-residential buildings, the questionnaire was designed in **modules**. Module A comprised questions on the building itself, for example the type and function of the building, its GPS coordinates, the number of floors, the number of housing units and a photograph for every 10th building. Modules B and C cover questions on the household and its demographic characteristics: age and sex of all household members and visitors, their education, marital status and length of stay in the household.

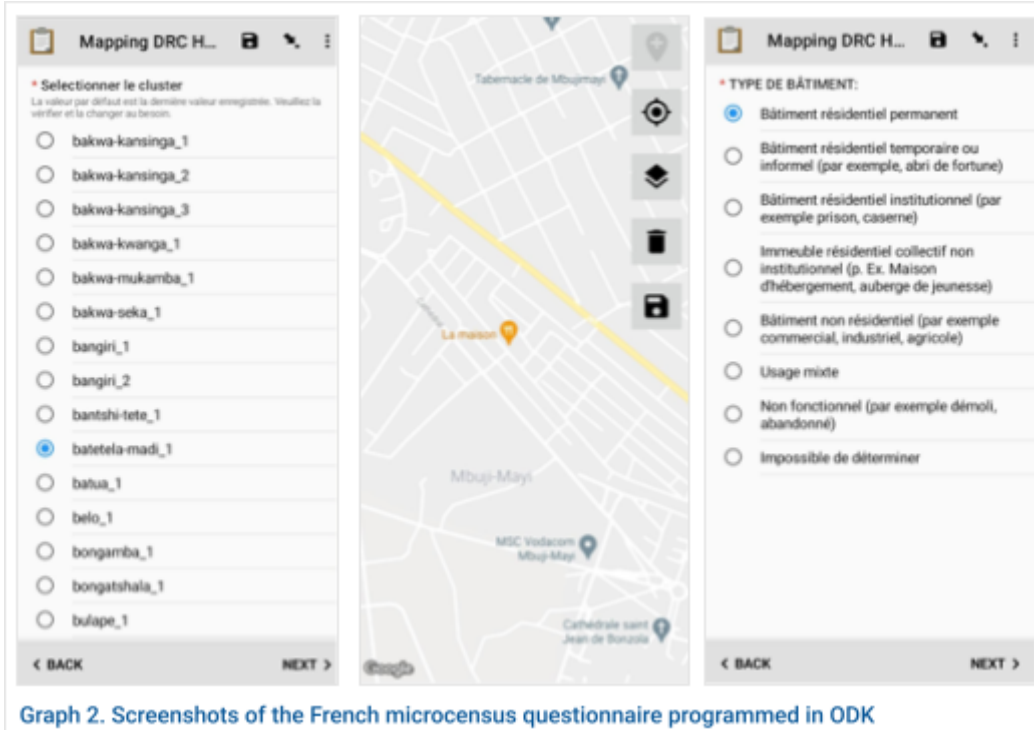
For Flowminder's modelling work on mobility, additional questions were included in extra modules, which were administered to every 10th household (in order not to increase the length of all household interviews). Modules H to R included questions on household infrastructure and assets, on mobility and migration and on mobile phone use. If specific consent was given, a picture of the residential building (without respondents) was also taken as part of these extra modules.

At the end of each household interview, an interviewer questionnaire prompted interviewers to fill in information about the interview setting, such as the language version of the questionnaire that was used, the spoken language during the interview, on compliance of the main respondent and any further comments on the interview setting.

The questionnaire was programmed in **OpenDataKit (ODK)**, a software used for data collection (see graph 2). For recording the GPS coordinates, ODK offers a live view of the current location based on **offline maps**. These offline maps needed to be created before fieldwork based on the building footprints, cluster boundaries and satellite imagery. To this end, **eHealth Africa** was

contacted and contracted as a technical partner. The offline maps (so-called MBtiles) were then shared with KSPH to be uploaded to the tablets for later use in the field.

Get ODK was sub-contracted by KSPH as a technical partner, both to support programming of the questionnaire and to get access to a stable, high-capacity server for data collection.

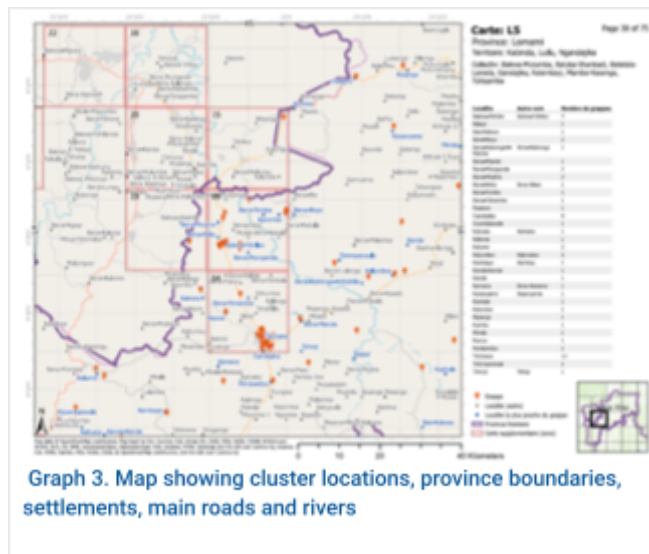


Graph 2. Screenshots of the French microcensus questionnaire programmed in ODK

5. Logistics and approvals

After the questionnaire was finalised, the survey design and questionnaire were submitted to the **ethics committee** of Kinshasa university for approval, which was received on 20 January 2021.

For navigation to clusters and between clusters, teams were provided with digital and analogue tools. On the one hand, they were instructed to use **OsmAnd**, a navigation tool based on offline maps - ideal for use in areas with no internet connection. On the other hand, WorldPop provided detailed **PDF maps** of all provinces (for printing), showing major roads and landmarks, as well as locations of clusters to be visited (see graph 3).



Graph 3. Map showing cluster locations, province boundaries, settlements, main roads and rivers

Based on the selected clusters, Flowminder developed an **algorithm** and routes for suggested itineraries for each team, laying out an **optimal route** to travel between clusters. These routes were shared with all teams as an additional resource. Due to the lack of complete and reliable data on roads and rivers, these itineraries were only reflecting the shortest aerial distance, whereas the actual road network or natural barriers on the ground could not be included.

All teams were equipped with **tablets** (one tablet per interviewer, two spare tablets per province), memory cards and power banks for charging the tablets, branded shirts and caps, backpacks, rubber boots, raincoats and helmets (for drivers of motorcycles), and with information sheets for respondents. Procurement was organised and implemented by KSPH.

Furthermore, all coordinators, supervisors and enumerators were issued a **photo ID**, to enable them to be identifiable during field work. To ensure endorsement and authorisation by national and local authorities, a **mission order** document (*ordre de mission*) was provided by the Ministry of Health, and subsequently by the *divisions provinciales* of the Ministry of Health, for each province, listing each interviewer, to show to local authorities as well as respondents, if needed.

6. Recruitment, training and pilot interviews

Recruitment and training was conducted in two stages. First, seven provincial coordinators were recruited and trained in Kinshasa - one coordinator for each province. Training took place from 2 February to 6 February, including two days of pilot interviews in Kinshasa (4 and 5 February) and a debriefing. The training was designed and led entirely by the KSPH project team. KSPH also shared the data from the pilot interviews with Flowminder and WorldPop, to allow checks for data quality.

In the second stage, the coordinators were sent to the provinces and started recruiting field staff for the data collection. Depending on travel options, some provinces started this phase earlier than others (see table 2). Training with selected staff was then held in each provincial capital, including pilot interviews in selected urban areas. At the end of the training the teams were formed: five teams of six interviewers each, with one supervisor per team. In total, 35 persons per province and 245 persons for the entire microcensus made up the total number of field staff who collected the microcensus data in the seven provinces selected.

Table 2. Arrival dates of coordinators in the provinces, start and end dates for the microcensus (2021)

Provinces	Arrival date of coordinator	Start date of full survey	End date of full survey
Haut-Katanga	05 March	15 March	21 April
Haut-Lomami	06 March	17 March	27 April
Ituri	04 March	15 March	24 April
Kasaï	28 February	14 March	25 April
Kasaï-Oriental	06 March	15 March	24 April
Lomami	05 March	15 March	26 April

Sud-Kivu	15 March	23 March	28 April
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7. Data collection

Data collection for the full microcensus started first in Kasai (14 March), followed by Haut-Katanga, Ituri, Kasai Oriental and Lomami (15 March), Haut-Lomami (17 March) and Sud-Kivu (23 March). All teams operated in parallel. During the data collection phase, each team was in close contact with the respective provincial coordinator, who in turn reported regularly to the KSPH team in Kinshasa. For each province, KSPH and Flowminder received daily updates on data collected, clusters covered and incidents of any sort. Daily updates between KSPH and Flowminder ensured that all encountered problems were resolved almost instantaneously and communicated back to field staff. By 28 April, data collection was complete in all provinces.

In total, 1,497 clusters were accessed and enumerated (see table 3). Only for 99 clusters (6% of the total gross sample) access was not possible. In most cases, clusters were inaccessible due to security risks (55 clusters). Other reasons for inaccessibility were flooding (11 clusters), physical barriers such as thick forest or rivers (17 clusters), or cases where access was denied locally (7 clusters).

Sud-Kivu was the province with the highest share and number of inaccessible clusters, and the only province where the goal of covering at least 200 clusters was narrowly missed. Security incidents and concerns posed a severe challenge for the field teams there, and after weighing all arguments, the coordination team (Flowminder and KSPH) decided to stop data collection after all accessible sites had been reached. In 30 out of the 34 inaccessible clusters there were known security risks.

Ituri was the second province that proved very difficult to cover. Although only 17 clusters were not accessible in the end, security risks also constituted a major obstacle in Ituri. Of the 17 inaccessible clusters, 16 fell under this category because of known security risks. Also in this province, the coordination team weighed considerations about prematurely ending field work.

In the last weeks of data collection, the coordination team intensified efforts to **monitor security information** for both provinces, to communicate this information instantly to field teams, and to assess the developments on the ground on an ongoing basis. Maps were created to locate teams on the ground, clusters covered and not yet covered, known security situations and remaining routes. Intensified deliberations between teams, provincial coordinators, local authorities and the overall coordination team ensured that decisions could be made fast and efficiently. In the end, data collection finished in time and without major harm to respondents and field staff.

Out of the 1,497 clusters covered, 94 clusters were unpopulated. Partly these were abandoned villages or hamlets, partly it was misclassification of buildings as recognised by algorithms applied to satellite imagery. Field teams reported rocks, termite hills, graves or other structures where available data showed building footprints. These records will be assessed during the data cleaning phase.

An analysis of clusters covered by province and settlement type (table 4) shows that in urban and periurban areas, almost all clusters could be accessed in all provinces. Also for villages, accessibility was not a (major) issue in six out of seven provinces. However, in Sud-Kivu only 46 out of 57 villages in the gross sample were accessible. Hamlets were the most difficult to access type of settlement, with shortfalls in all provinces, particularly in South Kivu (40 out of 57), Kasai (45 out of 47), Haut-Lomami (46 out of 57) and Ituri (48 out of 57). In total, information was collected on 334 hamlets, 381 villages, 384 periurban areas and 398 urban areas.

Table 3. Cluster coverage by province

Province	Clusters covered (accessible)			Inaccessible clusters	
	Total net sample	of which populated clusters	of which clusters without population	nr	share
Haut-Katanga	218	199	19	10	4%
Haut-Lomami	215	197	18	13	6%
Ituri	211	206	5	17	7%
Kasai	212	191	21	16	7%
Kasai Oriental	225	209	16	3	1%
Lomami	222	210	12	6	3%
Sud-Kivu	194	191	3	34	15%
Total	1,497	1,403	94	99	6%
Share of clusters (gross sample)	94%	88%	6%	-	6%

Coverage data and final microcensus data (version 2.2), unweighted

Table 4. Net sample of covered clusters by province and settlement type, including unpopulated clusters

Province	Hamlet	Village	Periurban	Urban	Total
Haut-Katanga	50	57	55	56	218
Haut-Lomami	46	55	57	57	215
Ituri	48	53	53	57	211
Kasai	45	56	54	57	212
Kasai Oriental	54	57	57	57	225
Lomami	51	57	57	57	222
Sud-Kivu	40	46	51	57	194
Total	334	381	384	398	1,497

Coverage data and final microcensus data (version 2.2), unweighted

7.1. Household non-response

The total overall household response rate was 94.6% (see table 5). Refusals (0.4%) were rare, while the main reason for household non-response was absent households (3.2%) and underage respondents or persons whose relationship to the household was unclear (1.1%).

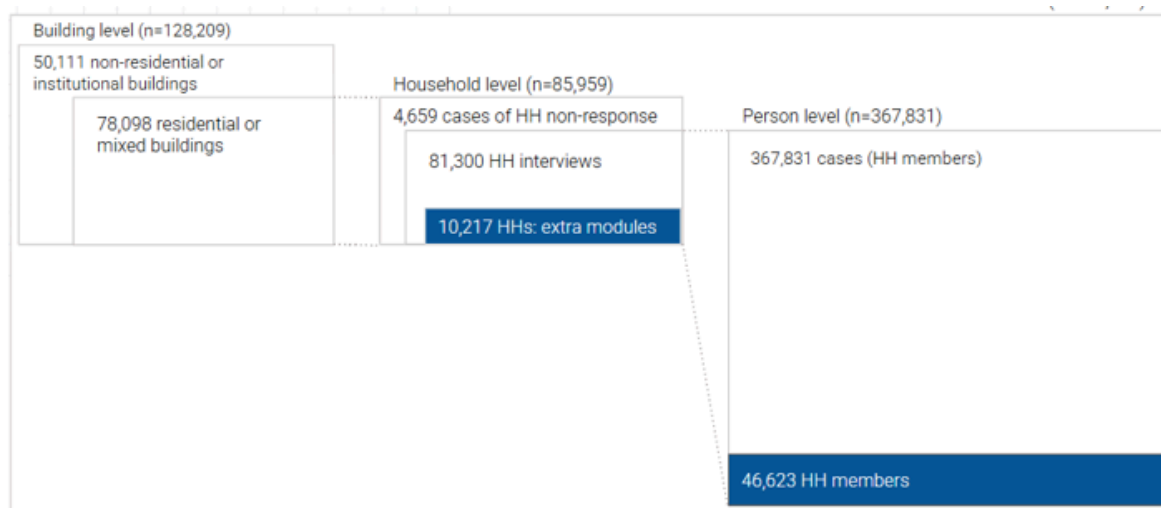
Table 5. Household response and non-response by categories

Response categories	Nr of HHs	% of HHs
Refusal	339	0.4%
Minor/unclear - respondent not available	972	1.1%
Not knowledgeable - respondent not available	579	0.7%
No one present - respondent not available	831	1.0%
Household absent - respondent not available	1,922	2.2%
Access barred - respondent not available	14	0.0%
Language barrier - respondent not available	11	0.0%
Could not be ascertained	14	0.0%
Household response	81,300	94.6%
Total	85,982	100%

8. Dataset

The final dataset comprises exactly 422,355 cases. This includes data on 128,002 buildings, 85,982 households and 367,792 individuals (see graph 4). Data in this dataset are nested (a *long* dataset in technical terms). For non-residential buildings or institutional buildings, one case represents one building. For residential buildings, the dataset may include more than one case: each household represents one case, and each person in each household represents a case. For a small minority of households (4,682), no further information is available (so-called household non-response). Additional information on household infrastructure, mobility and phone use was collected from 10,217 households, covering 46,618 household members (in blue in graph 4).

Graph 4. Data structure of the microcensus dataset



Final microcensus data (version 2.2), unweighted
 Disaggregated by province, case numbers differ (see table 6). The number of buildings listed ranges from around 13,000 in Haut-Katanga to almost 22,000 in Sud-Kivu. The number of households listed varies from around 11,000 in Sud-Kivu and Ituri to almost 15,000 in Kasai Oriental. The number of persons listed ranges from around 39,000 in Haut-Katanga to almost 72,000 in Kasai Oriental.

Table 6. Number of cases by province

Province	Buildings listed	Households listed	Persons listed
Haut-Katanga	13,262	11,090	38,744
Haut-Lomami	17,075	12,535	55,532
Ituri	19,039	10,821	40,042
Kasai	17,681	12,909	54,971
Kasai Oriental	18,875	14,959	71,692
Lomami	20,281	13,073	58,011
Sud-Kivu	21,789	10,595	48,800
Total	128,002	85,982	367,792

Final microcensus data (version 2.2), unweighted

9. Timeline

Activity	Date (actuals)
Set-up	
Set-up and Contracts	01 November - 07 December 2020
Logistics and Budget	06 January - 08 February 2021
Survey design and set-up	01 December 2020 - 12 March 2021

Logistical preparations	13 January - 22 March 2021
Training and Testing	02 February-22 March 2021
Pilot interviews	
Kinshasa	04 February - 06 February 2021
Provinces	09 March - 22 March
Full data collection	
Kasaï	14 March - 25 April 2021
Ituri	15 March - 24 April
Haut-Katanga	15 March - 21 April
Kasaï -Oriental	15 March - 26 April
Haut-Lomami	17 March - 27 April
Lomami	15 March - 22 April
Sud-Kivu	23 March - 27 April

10. Suggested citation

Methodology Report

Flowminder Foundation (2022) Methodology report for the DRC microcensus 2021 in the provinces of Haut-Katanga, Haut-Lomami, Ituri, Kasaï, Kasaï-Oriental, Lomami and Sud-Kivu (Democratic Republic of the Congo).

Data

Flowminder Foundation, École de Santé Publique de Kinshasa, University of Southampton, Bureau Central du Recensement, Institut National de la Statistique (2021) Microcensus in the provinces of Haut-Katanga, Haut-Lomami, Ituri, Kasaï, Kasaï-Oriental, Lomami and Sud-Kivu (Democratic Republic of the Congo). [Dataset]. Version 2.2.